Course Number and Title

PCB 5338, Principles of Ecosystem Ecology

Catalog Description

This course will explore the basic principles that govern structure and function across all ecosystems. We will begin by examining the exchange of energy and materials between ecosystems and the atmosphere, focusing much of our attention on ecosystem carbon cycling and nutrient constraints over the carbon cycle. We will examine transfers of energy from primary producers to higher trophic levels and how herbivory and disturbances such as fire affect carbon and nutrient cycling. We will examine how elevated atmospheric CO_2, changing climate, increased atmospheric nitrogen deposition, biological invasions, and losses of biodiversity alter ecosystem processes. We will also discuss human dependence on ecosystems and how our activities are altering systems at local, regional, and global scales.

Credit Hours

3

Pre-requisites and Co-requisites

Biology, General Ecology, Chemistry

Instructor Information

Name: Jennie DeMarco
Office location: 618A Carr Hall
Telephone: 262-5226
E-mail address: jennied@ufl.edu
Office hours: M and W, 3:15-5:00pm, & by appointment

Course Objectives

• Teach the basic principles and concepts of ecosystem ecology
• Introduce current uncertainties and controversies in ecosystem ecology
• Increase awareness of human-induced global changes and how they are affecting ecosystem processes
• Increase awareness of human dependency on ecosystem processes
• Apply understanding of ecosystem ecology to environmental problem solving

Course Meeting Time(s)

Monday and Wednesday, 1:55-3:10pm

Course Meeting Location(s)

McCarty Hall A 2186

Course Website

Course materials and related information will be posted on the course E-Learning (Sakai) website. You are responsible for all announcements made in class and/or posted on the course website for this course at http://lss.at.ufl.edu.

Fees

Material and Supply Fee

None

Equipment Fee

None

Other Fees

None

Required Materials

The required text for the course is a textbook written by F. Stuart Chapin, Pamela Matson, and Peter Vitousek, Principles of Terrestrial Ecosystem Ecology, second edition. **This text is available for a free download via a UF library purchase of packaged materials.** To access it, you must be logged into your Gatorlink account on an on-campus computer or a VPN link. Click on this link: http://link.springer.com/book/10.1007/978-1-4419-9504-9/page/1. You can then download the text. Please contact your instructor if you have any difficulties. Readings from this text are required and you will be quizzed on their content in class.

There will also be required readings from the primary literature that will supplement lecture materials. These will be posted on this website. The purpose of these papers is to expose you to both classic and current ideas and to promote your understanding of ideas through discussion.

Recommended Materials

Weekly readings will be posted on the course website.

Course Overview

Welcome to Ecosystem Ecology. I hope that you will come away from this course with a better understanding of the basic principles that govern structure and function across all ecosystems. At the same time, I hope that you will come away with a better appreciation of the unique nature of the ecosystems where you work and live. My goal is to give you the conceptual tools that will help you understand both the processes that underlie similarities among all ecological systems, and the processes that generate unique aspects of individual systems. We will also tackle some of the grand challenges of our time: global warming, rising atmospheric CO_2, loss of biodiversity, invasions by non-native species, pollution of lakes, rivers, and coastal waters–and how these environmental problems affect ecological systems. My goal for the course is not necessarily to turn all of you into ecosystem ecologists (although that would be great!). Rather, I hope to provide you with a basic understanding of the principles of ecosystem ecology that will help you progress in your own studies of ecological systems.

The course is roughly divided into halves over the course of the semester. The first half will provide some background on the history of ecosystem ecology and on climate and soils, but will focus primarily on element cycling, particularly carbon and nutrient cycles. We will examine the energy base of ecosystems–what controls carbon fixation by plants and what is the fate of that fixed carbon. We will also study nutrient inputs to, cycling through, and losses from ecosystems. The second half will focus on interactions and perturbations, including those resulting from human-induced global changes. We will examine transfers of energy from primary producers to higher trophic levels and how herbivory and disturbances such as fire affect primary production and nutrient cycling. We will examine how elevated atmospheric CO_2, changing climate, increased atmospheric nitrogen deposition, biological invasions, and losses of biodiversity alter ecosystem processes. We will also discuss human dependence on ecosystems and how our activities are altering systems at local, regional, and global scales.

This semester, the course is scheduled for two 75 minute periods on Monday and Wednesday. Discussions of current papers will be dispersed throughout the course to expose you to a wide range of literature and to give you the opportunity to practice the language of ecosystem ecology. Participation in both the lecture and discussion portions of the course is key, and you will be graded on your effort.

Course Outline

Week	Topic
1	Intro to Ecosystem Ecology
2	Geology and climate
3	Ecosystem energy balance and water cycling
4	Energy balance at the ecosystem surface
5	Water cycling through terrestrial ecosystems
6	Carbon cycling: productivity
7	Carbon cycling: decomposition and soil organic matter dynamics
8	Carbon cycling: net ecosystem carbon dynamics
9	Nutrient cycling: plant uptake and use
10	Nutrient cycling: nitrogen dynamics
11	Nutrient cycling: nitrogen versus phosphorus
12	Diversity and ecosystem processes
13	Trophic dynamics
14	Global biogeochemical cycles and the carbon-climate connection
15	Biome projects due
16	Reactive nitrogen in the biosphere
17	Earth stewardship: from ecosytems to ecosphere

Attendance Policy

Attendance is required of all registered students. The instructor should be notified in advance of planned absences and as soon as possible for unplanned absences.

Conduct in Class

Only approved electronic devices may be used in class. Approved electronic devices are laptop computers (when used to take notes or otherwise participate in classroom activities) and voice recording devices. Unapproved electronic devices include cell phones, video recorders, digital cameras and MP3 players.

Grading

Homework problems (10 points x 12 assignments = 120 points): The purpose of these problem sets is to exercise your quantitative skills and keep you thinking actively about the material. They may include short-answer questions, short-essay questions, and calculations. Essay questions will require approximately a paragraph-length answer. Complete, well-structured paragraphs are unnecessary. Phrases, sentences or "bullet points" that show what you know about a topic are sufficient. Possible kinds of questions that might be included on an exam are "What are the major factors that control rates of X in an ecosystem?" or "Given what you know about the controls over process X, how would you expect that process to differ in Ecosystem A and Ecosystem B?" or "Given a litter pool size of x and a litter fall input rate of y, calculate the decomposition constant for an ecosystem at steady state." These problems will be due in class prior to most lectures (see online lecture schedule) and will be reviewed, discussed and self-corrected in class. The instructor will collect and grade them.

Quizzes (10 points x 12 quizzes = 120 points): These will be given at the beginning of each lecture class to test your comprehension of the assigned reading in the text book. They will be graded by your instructor.

Discussion participation (10 points x 12 discussions = 120 points): You will be graded on your participation in class discussions. My expectation is that you will keep abreast of readings of and lecture materials, and that you will come to each class prepared with questions and a mindset that will enable you to interact with me and your peers in a lively way.

Discussion participation will be graded on the following scale:

High (10 points): many contributions, prepared questions, animated responses to peers or instructor, participation in multiple topics, "active listening."

Medium (7.5 points): some contributions, prepared questions, responses to direct questions from peers or instructor, participation in a few topics, "active listening."

Low (5 points): few contributions, no prepared questions, few responses to direct questions, lack of eye contact or "active listening."

Discussion leadership (1 assignment x 120 points): Teams of students will be in charge of leading lively discussions of primary literature. Weekly readings will be selected by your instructor.

Discussion leadership will be graded on the following components:

Preparation (40 points): organization and clarity of presentation, evidence that a format for discussion has been planned.

Familiarity with readings (40 points): careful reading of paper evidenced by ability to locate specific information in paper, ability to explain goals, results and conclusions, and identification of problems or difficult areas.

Background knowledge of the paper (20 points): Who are the authors'? What else have they published? How "important" are they to ecosystem ecology? Does the paper have web appendices? Were there "News and Views" published about the paper? Was there press coverage? How many times has it been cited? Have retractions or errata been published?

Ability to draw peers into discussion (20 points): this could take many forms, including questions posed, written responses required, brainstorming, debates, games, drawing "mind-maps..." The goal is to have a lively discussion where most students participate.

The biome project (1 assignment x 120 points): Students will work in teams to construct estimates of pools, fluxes and flows for a chosen biome.

TOTAL POINTS POSSIBLE IN COURSE = 600

Grading Scale

Point Range (%)	Letter Grade	GPA equivalent
≥ 90.00	A	4.0
86.7 – 89.9	A-	3.67
83.3 – 86.6	B+	3.33
80.0 – 83.2	B	3.0
76.7 – 79.9	B-	2.67
73.3 – 76.6	C+	2.33
70.0 – 73.2	C	2.0
66.7 – 69.9	C-	1.67
63.3 – 66.6	D+	1.33
60.0 – 36.2	D	1.0
56.7 – 59.9	D-	0.67
< 56.7	E	0

For more information on grades and grading policies, please visit: http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

Grade Curve Policy

None

Make-up Policy

Make-up work (lecture and discussion participation, quizzes, discussion leadership, etc.) will not be given unless student has an illness documented by a doctor's note or the student notifies the instructor of a conflict prior to the absence and makes an alternative plan to complete the work.

UF Counseling Services

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.

Career Resource Center, Reitz Union, 392-1601, career and job search services.

Many students experience test anxiety and other stress related problems. “A Self Help Guide for Students” is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: http://www.counsel.ufl.edu/.

Honesty Policy

All students registered at the University of Florida have agreed to comply with the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

In addition, on all work submitted for credit the following pledge is either required or implied: “*On my honor I have neither given nor received unauthorized aid in doing this assignment*.”

If you witness any instances of academic dishonesty in this class, please notify the instructor or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at: http://www.dso.ufl.edu/judicial/procedures/academicguide.html.

Accommodation for Students with Disabilities

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: http://www.dso.ufl.edu/drp/services/.

It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

Software Use

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.